CLAIMS

What is claimed is:

1.   A test system for testing a microchip, the microchip
having a diode electrically accessible via an input pin and an
output pin of the microchip, comprising:

      a tester;

      a temperature forcing unit;

      a programmed computer;

      the programmed computer coupled to the tester and the
temperature forcing unit;

      the programmed computer programmed with a temperature
control program, the temperature control program configured
to:

      obtain a temperature target;

      cause the temperature forcing unit to thermally adjust
temperature of the microchip toward the temperature target;

      wait for a first interval of time;

      measure diode output voltage after the first interval of
time; and

      determine junction temperature proximal to the diode from
the diode output voltage measured.

2.   The test system, according to claim 1, wherein the tester
is configured to provide a fixed current directed to the input
pin for generation of the diode output voltage.

3.   The test system, according to claim 2, wherein the
temperature control program is configured to prompt the test
system to provide the fixed current to the input pin.

4.   The test system, according to claim 1, wherein the temperature control program is configured to determine a temperature error.

5.   The test system, according to claim 4, wherein the temperature error is determined by subtracting the junction temperature determined from the temperature target.

6.   The test system, according to claim 5, wherein the junction temperature is equal to:

$(A - V(T))/B,$

where A and B are constants and V(T) is the diode output voltage measured.

7.   The test system, according to claim 4, wherein the temperature control program is configured to provide a revised temperature target.

8.   The test system, according to claim 7, wherein the revised temperature target is the temperature target plus the temperature error.

9.   The test system, according to claim 7, wherein the temperature control program is configured to:

    (a) obtain the revised temperature target;

    (b) cause the temperature forcing unit to thermally adjust temperature of the microchip toward the revised temperature target;

    (c) wait for a second interval of time;

    (d) measure diode output voltage after the second interval of time; and

(e) determine the junction temperature anew from the
diode output voltage measured after the second interval of
time.

10. The test system, according to claim 9, wherein the
temperature control program is configured to determine the
temperature error anew from the diode output voltage measured
after the second interval of time and the revised temperature
target, to provide the revised temperature target anew by
adding the temperature error anew to the revised temperature
target, and to repeat (a) through (e) until the temperature
error anew is within a first threshold range.

11. The test system, according to claim 10, wherein the
temperature control program is configured to wait for a third
interval of time.

12. The test system, according to claim 11, wherein the
temperature control program is configured to repeat (a)
through (e) using a fourth interval of time in place of the
second interval of time.

13. The test system, according to claim 12, wherein the
temperature control program is configured to determine the
temperature error anew from the diode output voltage measured
after the fourth interval of time, and to repeat (a) though
(e) using the fourth interval of time until the temperature
error anew is within a second threshold range.

14. The test system, according to claim 13, wherein the
second threshold range is smaller than the first threshold
range.

15. A signal-bearing medium containing a program which, when executed by a processor in response to receiving thermal profile input, causes execution of a method comprising:

obtaining an initial temperature target;

causing a temperature forcing unit to thermally adjust temperature of a microchip toward the initial temperature target, the microchip having a diode;

waiting for a first interval of time;

measuring diode output voltage of the diode after the first interval of time; and

determining junction temperature proximal to the diode from the diode output voltage measured.

16. The signal-bearing medium, according to claim 15, wherein the method further comprises:

determining a temperature error; and

producing a revised temperature target by combining the temperature error and the initial temperature target.

17. The signal-bearing medium, according to claim 16, wherein the method further comprises:

(a)   obtaining the revised temperature target;

(b)   causing the temperature forcing unit to thermally adjust temperature of the microchip toward the revised temperature target;

(c)   waiting for a second interval of time;

(d)   measuring diode output voltage after the second interval of time; and

(e) determining the junction temperature anew from the diode output voltage measured after the second interval of time.

18. The signal-bearing medium, according to claim 17, wherein the method further comprises:

determining the temperature error anew from the diode output voltage measured after the second interval of time and the revised temperature target;

producing the revised temperature target anew by adding the temperature error anew to the revised temperature target; and

repeating the steps (a) through (e) until the temperature error anew is within a first threshold range.

19. The signal-bearing medium, according to claim 18, wherein the method further comprises waiting for a third interval of time.

20. The signal-bearing medium, according to claim 19, wherein the method further comprises repeating the steps (a) through (e) using a fourth interval of time in place of the second interval of time.

21. The signal-bearing medium, according to claim 20, wherein the method further comprises:

determining the temperature error anew from the diode output voltage measured after the fourth interval of time; and

repeating the steps (a) though (e) using the fourth interval of time until the temperature error anew is within a second threshold range.

22. The signal-bearing medium, according to claim 21, wherein
the first interval of time is an initial stabilization
interval, wherein at least one of the second interval of time
is a coarse adjustment interval, wherein the third interval of
time is a coarse stabilization interval, and wherein at least
one of the fourth interval of time is a fine adjustment
interval.

23. The signal-bearing medium, according to claim 21, wherein
the first threshold range is a coarse adjustment threshold
range, and wherein the second threshold range is a stability
band.

24. A method for thermally conditioning a microchip, the
method comprising:

     setting an initial temperature target;

     thermally conditioning the microchip responsive to the
initial temperature target over an initial stabilization
interval;

     measuring a first diode voltage of a diode of the
microchip;

     determining a first diode temperature responsive to the
first diode voltage measured;

     comparing the first diode temperature with the initial
temperature target to determine a first temperature error;

     (a) generating a coarse temperature target responsive to
the first temperature error and the initial temperature
target;

     (b) thermally conditioning the microchip responsive to
the coarse temperature target over a coarse adjustment
interval;

   (c) measuring a second diode voltage of the diode of the microchip after the coarse adjustment interval;

   (d) determining a second diode temperature responsive to the second diode voltage measured;

   (e) comparing the second diode temperature with the coarse temperature target to determine a second temperature error;

   thermally conditioning the microchip over a coarse stabilization interval;

   (f) generating a fine temperature target responsive to the second temperature error and the coarse temperature target;

   (g) thermally conditioning the microchip responsive to the fine temperature target over a fine adjustment interval;

   (h) measuring a third diode voltage of the diode of the microchip after the fine adjustment interval;

   (i) determining a third diode temperature responsive to the third diode voltage measured; and

   (j) comparing the third diode temperature with the fine temperature target to determine a third temperature error.

25. The method, according to claim 24, wherein the coarse temperature target, the second diode voltage, the second diode temperature and the second temperature error are generated from one or more iterations of the steps (a) through (e).

26. The method, according to claim 25, wherein the fine temperature target, the third diode voltage, the third diode temperature and the third temperature error are generated from one or more iterations of the steps (f) through (j).